Environmental Geology Section
Mineral Development Division
Department of Mines and Energy
Government of Newfoundland and Labrador

INVENTORY OF AGGREGATE RESOURCES IN NEWFOUNDLAND AND LABRADOR

INFORMATION REPORT AND INDEX MAPS

TO ACCOMPANY AGGREGATE RESOURCE MAP SERIES, 1:250,000
(OPEN FILES NFLD. 1287 AND LAB. 602)

by

F.T. Kirby, R.J. Ricketts and D.G. Vanderveer

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Authors' Note

Aggregate resources designations as outlined in this report and on the maps herein described do not necessarily guarantee resource accessibility for any particular site.

A quarry permit is required from the Department of Mines and Energy for removal of any quarry materials from any Crown Lands or private lands, except where the mineral rights are subject to lease, grant or license.

Copies of all maps and data mentioned in this report are available through the Publications and Information Section, Newfoundland, Dept. Mines & Energy, P.O. Box 4750, St. John's, Newfoundland A1C 5T7 (Tel: 709-737-3159).

The maps to accompany this report are as follows:

Open File Nfld. 1287

83-01 Trepassey, 1K
83-02 St. Lawrence, 1L
83-03 Port aux Basques, 11O
83-04 Burgeo, 11P & 11I
83-05 Belleoram, 1M
83-06 St. John's, 1N
83-07 Bonavista, 2C
83-08 Gander Lake, 2D
83-09 Red Indian Lake, 12A
83-10 Stephenville, 12B
83-11 Bay of Islands, 12G
83-12 Sandy Lake, 12H
83-13 Botwood, 2E
83-14 Wesleyville, 2F
83-15 Port Saunders, 12I
83-16 Blanc-Sablon, 12G
83-17 St. Anthony, 2M

Open File Lab. 602

83-18 Minipi Lake, 13C
83-19 Lac Joseph, 23A
83-20 Opocopa Lake, 23B
83-21 Shabogamo Lake, 23G
83-22 Osokmanuan Lake, 23H
83-23 Winokapau Lake, 13E
83-24 Goose Bay, 13F
83-25 Rigolet, 13J
83-26 Snegamook Lake, 13K
83-27 Kasheshibaw Lake, 13L
83-28 Shefferville, 23J
83-29 Makkovik, 13O

INVENTORY OF AGGREGATE RESOURCES

IN NEWFOUNDLAND AND LABRADOR

by

F.T. Kirby, R.J. Ricketts and D.G. Vanderveer

ABSTRACT

The Inventory of Aggregate Resources Program was begun in 1978 with funding provided under the Canada/Newfoundland Mineral Development Subsidiary Agreement. Between 1975 and 1977 some aggregate resource information was collected as part of the Surficial and Glacial Mapping Program.

The purpose of the survey reported here was to provide information on aggregate resources (sand, gravel, stone suitable for crushing, and/or ballast or nongranular materials suitable for beneficiation for use in construction), along all existing and/or proposed transportation routes in Newfoundland and Labrador. A 6 km wide corridor centering on and parallel to all existing and proposed transportation routes was selected as the study area. The study area also included an 8 to 80 km radius around all towns or large population centers. These data will be used to provide for the effective management of these vital nonrenewable aggregate resources.

The study consisted of a preliminary surficial interpretation followed by field mapping and sampling. Granular resources were normally sampled at 500 m intervals and nongranular materials were sampled at 1.5 - 2 km intervals. Data gathered included landform and stratigraphic information as well as field descriptions of the sample and deposit types. Particle size and lithological analyses of the materials sampled were also conducted.

The locations of samples and deposits are plotted on 1:50,000 scale topographic base maps and are summarized for publication at a 1:250,000 scale. Surficial and bedrock geology maps were produced at 1:50,000 and 1:250,000 scales, respectively for open file release.

Work is progressing on a computer package that will report on all coded field and laboratory data in an "english-like" format and enable the search and retrieval of selected data for various users and for various purposes.

The first phase of the Inventory of Aggregate Resources Program is nearing completion and approximately 10,000 samples have been collected throughout Newfoundland and Labrador.

Data are now on file for approximately 10,000 samples (Ricketts et al., 1981). Data include site and sample information, particle size analyses and cumulative graphs, lithological analyses, petrographic numbers, stratigraphic logs and photographs.

INTRODUCTION

The surficial geology of Newfoundland is a complex mixture of depositional and erosional environments. The distribution of washed sediments such as glaciofluvial and glaciomarine derived deposits is generally sparse, especially in relation to areas of greatest aggregate demand.

Existing and potential shortages of aggregates are compounded by deposit quality problems such as silt/clay content, lithologic weaknesses, and deleterious substances. Other problems encountered are: (1) low quality usage of high quality aggregate reserves; (2) sterilization of resources through conflicting land uses; and (3) a low population density - low demand situation which precludes expensive rock crushing or beneficiation of poorer quality deposits in areas where naturally occurring aggregates are in short supply.

AREA OF STUDY

A corridor approximately 6 km wide (*i.e.* 3 km either side) centered on and parallel to all existing, proposed or partially constructed highways and secondary roads in Newfoundland and Labrador and the QNS&L railway line in Labrador (Figures 1 & 2) was covered by the study. In the vicinity of other roads (forest access or tertiary roads or trails) capable of being upgraded for use by truck traffic, the corridors were extended parallel to these roads to include areas 6 km wide for distances of 8 km from the main highway or road under study or to the limit of any radius area listed as follows: an area of 25 to 80 km in radius in the vicinity of selected larger towns, cities or other growth centers (area dependent upon discernible existing aggregate resources and present or projected demands); an area of 8 km radius around smaller towns or communities serviced by road. Major development areas such as hydro-electric projects were also included in the study area. Forest access roads were not normally included in the study except as noted above. Active beach zones were not considered a part of the study but back beach areas above the maximum storm tide mark were included where they fell within the above defined corridor.

PREVIOUS WORK

Aggregate resource mapping was begun in 1975 to (1) determine the existing resources; (2) assess existing and potential problem areas; (3) monitor and aid in regulating the resource; and (4) provide basic information towards sound planning and management of this nonrenewable resource. In 1975 aggregate sampling was part of the Surficial and Glacial Mapping Program. In 1977 a pilot sampling program, the Inventory of Aggregate Resources, conducted analyses in areas previously mapped surficially (Grant, 1973; Brookes, 1974; Vanderveer, 1976, 1977). This program was supplemented in 1977 by sampling conducted under the Surficial and Glacial Mapping Program (Vanderveer and Sparkes, 1979).

PRESENT STUDY

The present project was begun in 1978 and was funded under the Canada-Newfoundland Mineral Development Subsidiary Agreement. The program was designed to provide an inventory of aggregate resources (sand, gravel, crushed stone, stone and ballast) along existing and proposed transportation routes in Newfoundland and Labrador and it attempts to show the location, size, quality, present degree of use, and potential of each deposit.

OFFICE PROGRAM

The office program consisted of reconnaissance level airphoto interpretation (about 1:50,000 scale) of the study area with the emphasis placed on locating glaciofluvial, glaciomarine, and other landforms that might be the host of quality aggregate deposits. A

FIGURE 1
NEWFOUNDLAND INDEX MAP OF STUDY AREA

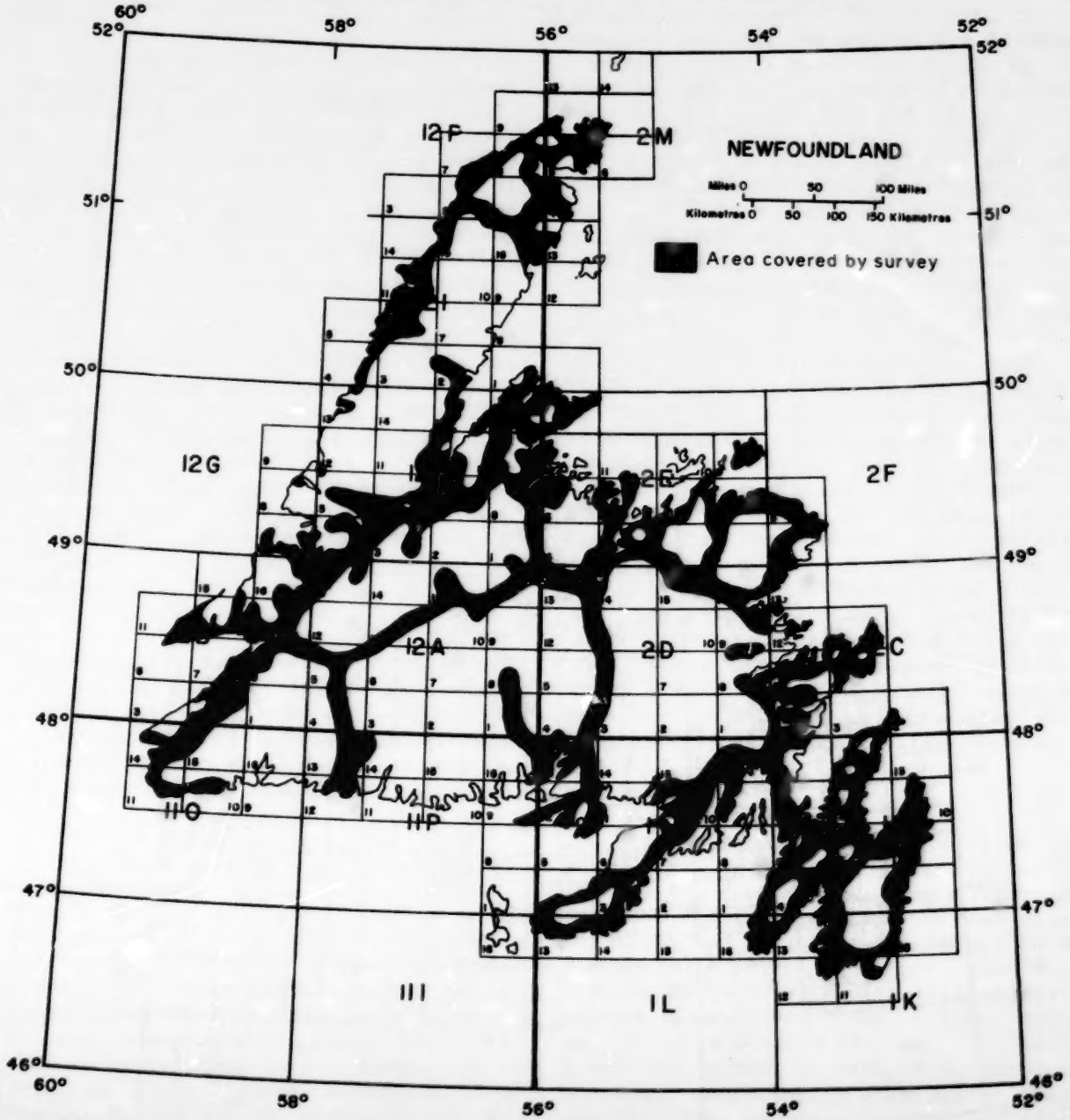
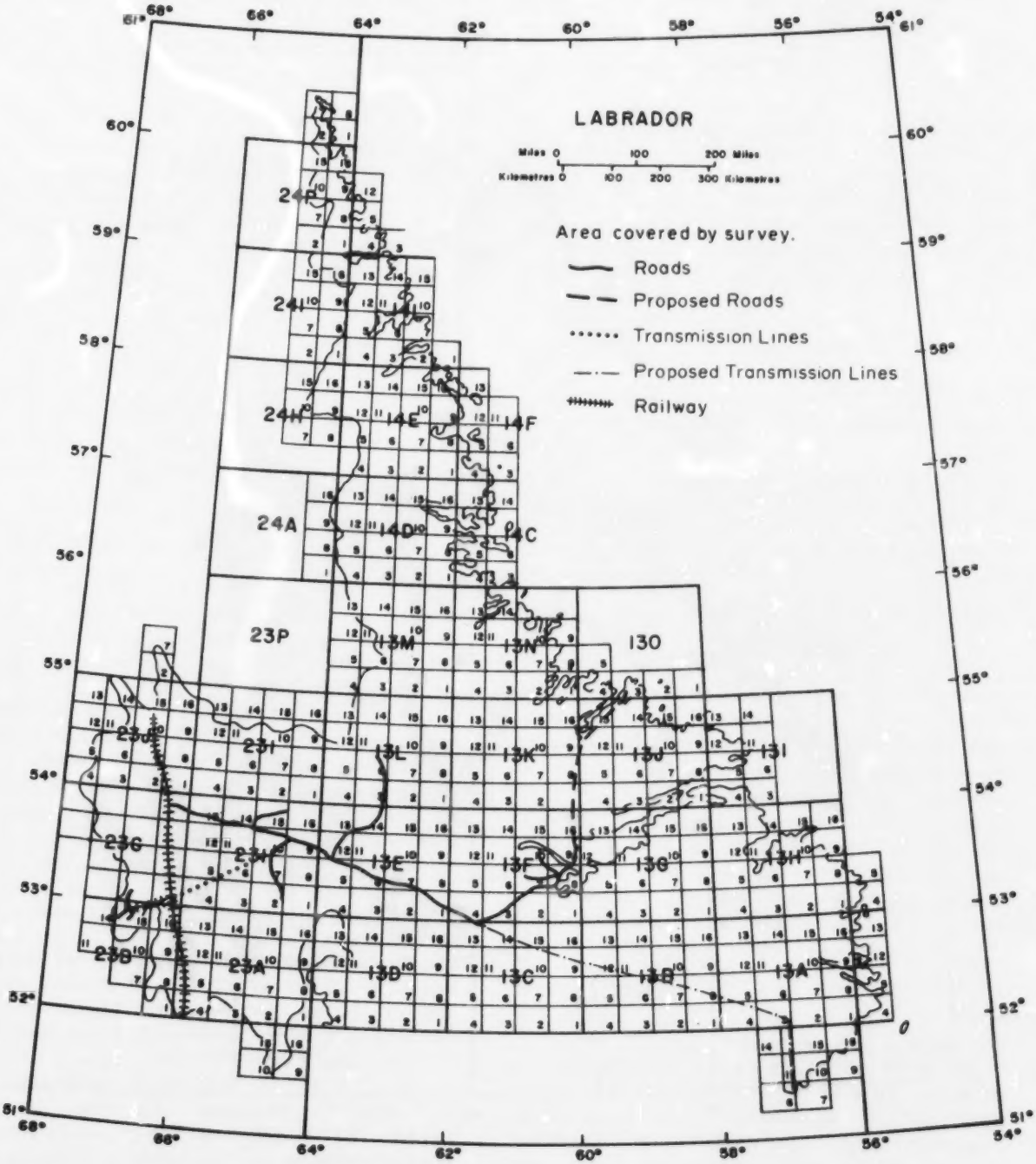


FIGURE 2

LABRADOR INDEX MAP OF STUDY AREA



literature search of previous research was conducted and contact was made with the Department of Transportation and Communications for any data they may have had on various aggregate deposits.

FIELD WORK

Field work was normally conducted by vehicle or foot traverses, but in areas of poor road access, helicopter, canoe, and all-terrain vehicles were used. Granular resources (sand and gravels) were normally sampled at intervals of 500 to 1000 m wherever they occurred within the 6 km wide corridor study area. Nongranular materials (glacial till, colluvium, bedrock, etc.) were sampled only along the primary, secondary, and tertiary roads or railway lines around which the corridor area was centered. These were generally sampled at intervals of 1.5 to 2 km. Additional samples of granular and nongranular materials were taken wherever depositional changes were observed, where quality differences were apparent, or wherever products of varying quality or depositional characteristics occurred together that could possibly be mined separately.

Generally, sample sites were limited to existing natural (stream or coastal cuts) or man-made (road cuts, pits and quarry excavations, etc.) exposures. In areas of potential granular resources, pits were hand dug if no other exposures existed.

All field and sieve data were placed in coded format on two separate forms. Form I (Figure 3), gives general site information including data on location, landforms, stratigraphy, ice movement indicators, and notation for photo numbers and extra notes. See Figure 4 for the codes. Form II (Figure 5), gives a field description of the sample, plus data on field sieve analyses. See Figures 6A and 6B for a summary of the code format for Form II. A stratigraphic log (Figure 7) was compiled where relevant.

Field sieve analyses were conducted on most samples containing +8 mm size material. Moisture tests were usually conducted on every second or third sample if the deposit remained consistent along the traverse route; otherwise, this test was done at every sample location. During the field sieve analysis, approximately 10 to 20 kg of material was sampled, weighed and sieved through a bank of four 30 cm diameter sieves (mesh sizes 63 mm, 31.5 mm, 16 mm and 8 mm). The total sample weight and the weights retained on each field sieve and canvas were recorded on Form II. A 500 to 1000 gm split of the -8 mm sand/silt/clay fraction was retained for laboratory sieve analyses. If a sample had a high silt/clay content and/or a high moisture content, it might be wet sieved; *i.e.* washed through the bank of field sieves. A bulk sample (500 to 1500 gm, minus any larger stones) was taken and returned to the laboratory for sieve analysis when sieve analysis was not conducted in the field. A split (100 to 200 pebbles) of the smaller than 32 mm and larger than 16 mm size pebble fraction of each sieved sample was saved for the field pebble lithological study. All samples were taken from fresh unweathered exposures and from below the normal soil horizon wherever possible. Where exposures permitted, channel sampling or multiple spot sampling was used to ensure a representative sample.

LABORATORY PROGRAM

The laboratory program consisted of sieve analyses of the sand/silt/clay (-8 mm) fraction of each sample returned from the field. These analyses consisted of drying and splitting the sample to a manageable size (70 to 140 gm), then dry sieving through a bank of eight sieves (8 mm, 4 mm, 2 mm, 1 mm, 0.5 mm, 0.25 mm, 0.125 mm and 0.062 mm) for each sample of gravel or sand, *i.e.* samples containing very little silt and/or clay material. The weights retained on each sieve and in the pan were recorded on Form II (Figure 5).

FIGURE 3

FIELD FORM I

MINERAL DEVELOPMENT DIVISION, ENVIRONMENTAL GEOLOGY SECTION, QUATERNARY GEOLOGY FORM 1 — Page of

GENERAL AND LOCATION DATE

CARD NO | FIRST SAMPLE NO | MAP NTS | SITE NO | UTM ZONE | EASTING | NORTHING | GEOL (INT) | YEAR | MO | DAY

NO OF CARDS | NO OF SAMPLES | ALTITUDE (m) | SOURCE OF ALT | COMMENTS

LANDFORMS
NAME | LENGTH (m) | WIDTH (m) | HEIGHT (m) | AGE | NATURE OF SLOPE | LOCAL RELIEF (m) | MODIFICATION | VEGETATION COVER | TOPSOIL | THICKNESS (M)

MAP LEGEND

DRAINAGE | MICRO RELIEF | TEX MOD | ERV. | GEOMORPH MOD | CST | TEX MOD | ERV | GEOMORPH MOD | CST | TEX MOD | ERV | GEOMORPH MOD

STRATIGRAPHY

SAMPLE NO | MAP NTS | SITE NO | UNIT | UNIT DEPTH (m) | UNIT THICKNESS (m) | SOIL HORIZON | STRAT LOG | OTHER CARD NO

DEPOSIT TYPE | DOM TEX | MIN TEX | CARBONATE | STRUCTURE | MISC COMPONENTS | DRAINAGE | LOWER CONTACT | GENESIS

STRATIGRAPHY

SAMPLE NO | UNIT | UNIT DEPTH (m) | UNIT THICKNESS (m) | SOIL HORIZON | STRAT LOG | OTHER CARD NO

DEPOSIT TYPE | DOM TEX | MIN TEX | CARBONATE | STRUCTURE | MISC COMPONENTS | DRAINAGE | LOWER CONTACT | GENESIS

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STRATIGRAPHY

SAMPLE NO | UNIT | UNIT DEPTH (m) | UNIT THICKNESS (m) | SOIL HORIZON | STRAT LOG | OTHER CARD NO

DEPOSIT TYPE | DOM TEX | MIN TEX | CARBONATE | STRUCTURE | MISC COMPONENTS | DRAINAGE | LOWER CONTACT | GENESIS

ICE MOVEMENT INDICATORS

TYPE | REL AGE | AZIMUTH | TYPE | REL AGE | AZIMUTH | TYPE | REL AGE | AZIMUTH | TYPE | REL AGE | AZIMUTH | OTHER CARD NO

PHOTOGRAPHS AND EXTRA NOTES

GEOLOGIST | MAP NTS | SITE NO | COLOUR SLIDES to | POLAROID to | COMMENTS

FIGURE 4

FIELD FORM I - CODE SHEET

General & Locational

Card No. must be completed

Source of Altitude

1. contour map (e.g. 100 CI)
2. altimeter
3. handlevelled
4. stadia

Landforms Name

channel	01
fan	02
lowland	03
midland	04
plain	05
ridge	06
scarp	07
terrace	08
upland	09
valley	10
hill	11
island	12

Age

1. Modern
2. postglacial
3. glacial
4. interglacial-interstadial
5. preglacial

Nature (NAT) of Slope

1. concave
2. convex
3. straight

Modification

channelled	01
congelifraction	02
congeliturbated	03
eroded	04
glaciated	05
gullied	06
kettled	07
rubble strewn	08
solifluxated	09
tension fractured	10
washed	11
wind blown	12

Vegetation Cover

1. forest
2. swamp or peat
3. mixed forest & swamp
4. barren or low shrub, bush
5. pasture
6. burnt over area

Drainage

well drained	1
mod. drained	2
poorly drained	3
partly drained	4

Micro Relief

closed depressions	1
featureless	2
flat	3
hummocky	4
ridged	5
undulating	6

Texture

01	gravel	>2.0 mm
02	boulder	>256 mm
03	cobble	64-256 mm
04	pebble	2.0-64 mm
05	sand	2.0-.05 mm
06	coarse sand	2.0-0.5 mm
07	medium sand	0.5-0.25 mm
08	fine sand	0.25-.05 mm
09	silt	.05-.002 mm
10	clay	<.002 mm

Map legend
(ENV) Environment
(Genetic Category)

glaciofluvial	G
lacustrine	L
marine	M
alluvial (fluvial)	A
colluvial	C
morainal (till)	T
organic	O
rock	R
eolian (dune)	E

Geomorph Mod. (Morphological Modifier

drumlinoid	d
plain	p
hummocky	h
ridged	r
veneer	v
terraced	t
eroded & dissected	e
complex	x
kettled	k
deltaic (fan)	f
lineated	l
concealed by vegetation	c
weathered	w
apron	a

CST (Complex)

1. Complex (I)
2. Complex (II)
3. Stratigraphy (refers to preceding unit only)
4. Transition (phasing of 2 Env's of equal X)
5. Stratigraphy (all preceding over following Env.)

Stratigraphy

Unit

upper most unit is Unit 1

Unit Depth

give the depth of the top of each unit as measured from the top surface of the exposure.

Soil Horizons

A - horizon

dark colored, organic	01
gray, leached	02

B - horizon

reddish colored (iron oxide)	03
clay-rich, blocky	04
undifferentiated	05
iron oxide cement; nodules	06

IC-horizon

noncalcareous	07
calcareous	08
poorly drained	09

2C-horizon

diff. unconsol. sed. from solum	10

R - horizon

consolidated bedrock	11

Z - horizon

permanently frozen layer	12

Stratigraphic Log

check off log compiled & give it a card no.

Deposit Type

01	glaciofluvial
02	lacustrine
03	marine
04	alluvial
05	colluvial
06	morainal (till)
07	organic
08	rock
09	kame
10	deltaic
11	esker
12	eolian (dune)
13	erratic
14	complex (specify)
15	glaciomarine
16	glaciolacustrine

Carbonate (1.4 HCL)

strongly calc	1
calc	2
slightly calc	3
noncalc	4

Structure

01	massive
02	stratified (>1 cm)
03	laminated (<1 cm)
04	cross bedded
05	stratified graded
06	laminated graded
07	imbricate
08	involuted
09	faulted, normal
10	faulted, reversed
11	fissile
12	jointed
13	blocky
14	varved
15	rhythmite

Miscellaneous Components

charcoal	01
gypsum	02
humus	04
iron oxide	05
manganese oxide	06
marl	07
peat	08
plant debris	09
shells	10
volcanic ash	11
weathered	12
wood	13
micaceous	14

Lower Contact

1. distinct
2. gradational
3. not visible

Genesis

1	glacial
2	glacial fluvial
3	alluvial
4	glaciolacustrine
5	lacustrine
6	colluvial
7	eolian
8	paludal (swampy or marsh)
9	rock
10	marine
11	glacio-marine

Ice Movement Indicators (Type)

01	striae (direction known)
02	striae (direction unknown)
03	groove
04	nailhead striae
05	crossing striae
06	stoss & lee forms
07	crag and tail (miniature)
08	crag and tail (hill size)
09	ramp and crag
10	roche moutonee
11	lunate or crescentic fracture
12	chatter marks
13	till fabric

Relative Age

oldest movement No. 1

Add Photos etc. as per sample & Photo No. assignments
Rock No = 900 series

NB Use of decimals in measurements, i.e. altitude use space after decimal to indicate accurate reading to ± 0.1 m to ± .5 m etc.

Topsoil Thickness = total of A & B

A - horizon

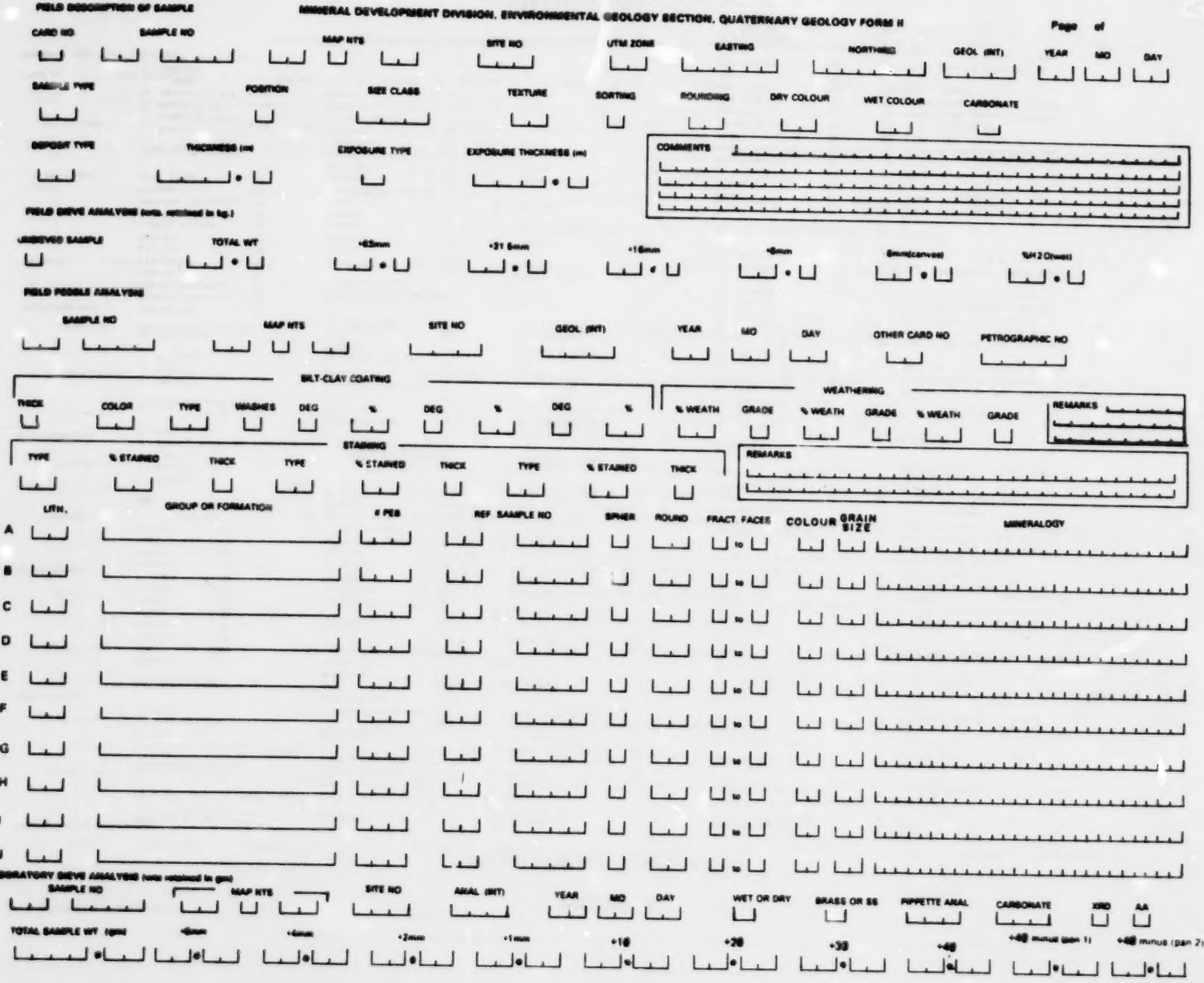
01	dark coloured organic
02	gray, leached

B - horizon

03	reddish colored (Fe oxide)
04	clay-rich, blocky
05	undifferentiated
06	iron oxide cement, nodule
07	no apparent topsoil present
08	perma frost

Use complexes if both A & B present, list in order of dom i.e. 13 = / organics over reddish B horizon

FIGURE 5: FIELD FORM II



Field Description of Sample

Sample Type

01 channel
02 spot
03 other (specify in comments)

Position

1. near surface (ie near oxidation level)
2. near top of exposure
3. midway or partway up exposure
4. near bottom of exposure
5. from homogeneous layer complex
6 from two or more layers of complex
7. undisturbed drift
8. From a disturbed deposit (i.e. bulldozed, slumped, soliflucted)

Size Class

001 clay
002 silt
003 sand
004 gravel
005 till

if stratified list in order of dominance ie 123 mixed clay, silt, sand or 513 = till + clay + sand, layers, etc.

006 rock
007 peat
008 marl
009 colluvium

Texture

01	gravel	>2.0 mm
02	boulder	>256 mm
03	cobble	64-256 mm
04	pebble	2.0-64 mm
05	sand	2.0-.05 mm
06	coarse	2.0-0.5 mm
07	medium	0.5-0.25 mm
08	fine	0.25-.05 mm
09	silt	.05-.002 mm
10	clay	<.002 mm

Sorting

1 well sorted
2. moderately sorted
3. poorly sorted

Rounding

01 angular
02 subangular
03 subrounded
04 rounded
05 well rounded

Note - for complexes use following i.e. 12=angular to subangular
i.e. 42=well rounded to subangular list in order of dominance, add extra space to form if needed.

Color

01 red
02 orange
03 yellow
04 green
05 blue
06 purple
07 black
08 brown
09 tan-brown
10 medium brown
11 dark brown
12 gray brown
13 olive
14 green brown
15 gray
16 blue gray
17 pinkish gray
18 dark gray
19 white
20 greenish gray
21 pinkish white

Carbonate (1.4 HCL)

1. strongly calc.
2. calc.
3. slightly calc
4. noncalc.

Deposit Type

01 glaciofluvial
02 lacustrine
03 marine
04 alluvial
05 colluvial
06 morainal (till)
07 organic
08 rock
09 kame
10 deltaic
11 esker
12 eolian (dune)
13 erratic
14 complex (specify)
15 glaciomarine
16 glaciolacustrine

Exposure Type

1. active quarry
2. inactive quarry
3. road cut
4. stream cut
5 coastal shore
6 lake shore
7 shallow hand dug
8 other
9 stockpile
10 natural rock exposure

Field Sieve Analysis

Unsieved Sample

- Check this square if aggregate sample taken and unsieved, otherwise leave blank.

ABBREVIATIONS

abandoned	abd.
ablation	abl.
abundant	abun.
alluvial	A
amphibole	amp.
bedrock	R
black	bl
brown	brn
borrow pit	b.p.q.
boulder	bo
carbonate	carb.
centimetre	cm
clay	cl
clayey	cly
cobble	cob
color	col
colluvial	C
compact	compc.
composition	comp.
conglomerate	cgl
creq + tail	C + T
cubic yard	cyd
cubic metre (store)	st.
dark	dk
dolomite	dol
drumlin (oid)	d
dune	Ed or El
eolian	E
eroded	e
exposed or exposure	exp
feldspars	K-Fsp P-Fsp
fluvial	F
glaciofluvial	G
granite	gr
gravel	grv
gravel pit	grv.q.
green	grn
gray	gy
grooves	grov.
gypsum	
high tide	H.T.
highways	Hwy
hummocky	h
humus	org
kame	K
kame terrace	Kt
large	lge
limestone	lmst
lodgement	lodm
long shore drift	LSD
loose rock	rx

Ref. Sample No. - must always be used even if Ref. is a sample of pebbles. If later the rock sample is found give it the same no. as ref. pebble sample and discard the pebble ref.
Color for rocks as per code for Form II

low tide		L.T.
metres		m
micas - biotite		bi
	- muscovite	musc
millimetres		mm
miscellaneous		misc.
mountains		mts
olivine		ol.
orange		orge
organics		O
outcrop		oct
pebble		peb
poorly washed		pw
pyroxene		pyx
leucocratic minerals		qtz cal
quarry	large	Q
	small	q
	bedrock	Rq or RQ
		small or large
	rock rubble	rxq
red		r
roche moutonnee		Rm
rock		R
rock quarry		Rq
rock rubble		rx
rounded		rd
sand		sd
sandy		sdy
sandstone		Ss
silt		sl
silty		sly
siltstone		Sls
striae		str
storm ridge		S.R.
stossing		sts
surface		surf
till		T
top surface		TS
undulating		und
veneer		v
volcanics		volc
well washed		w.w.
yellow		y

FIGURE 6A

FIELD FORM II - CODE SHEET

FIELD DESCRIPTION OF SAMPLE

FIGURE 6B

FIELD FORM II - CODE SHEET

FIELD PEBBLE ANALYSES

Field Pebble Analysis - Form II

Silt/Clay Coating

Thickness
1. thin (<0.25 mm)
2. medium (0.25 - 0.5 mm)
3. thick (>0.5 mm)

Types
01 clay — for complex use e.g. 12=clay/silt
02 silt — 13= " /sand
03 fine sand

Washes
1. easily
2. fairly easily
3. with slight difficulty
4. with difficulty

Degree
1. clean (no coating)
2. trace (10% pebble surface coated)
3. moderate (10-50% surface coated)
4. heavy (50% pebble surface coated)

Staining (can't be washed off)

Types
01 Manganese oxide (MnO)
02 Hematite (incl. Limonite)
03 Siliceous (SiO_2)
04 Calcareous ($CaCo_3$)
05 Dolmitic ($MgCa(CO_3)_2$)

Thickness
1. thin
2. thick

Weathering Grade

1. fresh or slightly weathered
2. slightly weathered
3. moderately weathered
4. highly weathered
5. intensely weathered
6. residual soil

Sphericity

1. very low
2. low
3. medium
4. high

Rounding

01 angular
02 subangular
03 subrounded
04 rounded
05 well rounded

Note - for complexes use following
i.e. 12=angular to subangular
i.e. 42=well rounded to subangular
list in order of dominance

Fractured Faces

list range i.e. 3 to 6 faces fractured, etc.

Color

01 red
02 orange
03 yellow
04 green
05 blue
06 purple
07 black
08 brown
09 tan-brown
10 medium brown
11 dark brown
12 gray brown
13 olive
14 green brown
15 gray
16 blue gray
17 pinkish gray
18 dark gray
19 white
20 greenish gray
21 pinkish white

Grain Size

01 amorphous (glassy)
02 aphanitic
03 fine
04 medium grained
05 coarse

For complexes list in order of dominance i.e. 34=fine to med grained

Mineralogy

List dom. minerals in order of predominance, use abbreviations as in Table 6a.

Lithology

01 shale
02 siltstone
03 gritty siltstone
04 fine sandstone
05 medium sandstone
06 coarse sandstone
07 graywacke
08 arkose
09 lithic arkose
10 conglomerate (clastic)
11 breccia (clastic)
12 limestone
13 dolomite
14 gypsum
15 chert
16 conglomerate (chem.)
17 breccia (chemical)
18 pelitic schist
19 slate
20 paragneiss
21 gneiss
22 granite
23 diorite
24 diabase
25 gabbro
26 ultramafics
27 tuff
28 welded tuff (ignimb)
29 rhyolite
30 andesite
31 basalt
32 quartzite
33 granodiorite
34 syenite
35 metasediments
36 phyllite
37 hornblendite
38 quartz pebble
39 flysch sediments
40 marble
41 monzonite
42 norite
43 anorthosite
44 amphibolite
45 migmatite
46 pegmatite
47 argillite
48 volcanic breccia
49 acidic volcanic
50 unidentified, mic., or weathered beyond recognition
51 basic volcanics
52 agglomerate
53 hornfels

CSA STANDARD A23.2.30

Rock Type	Classification	Factor	Weathering Grade	Final Petrographic Factor
Carbonates (hard) good				
Carbonates (sandy, hard)	good	1		1
Sandstone (hard)	good	1	1,2	
Gneiss (hard)	good	1		
Quartzite (coarse grained)	good	1	3	3
Graywacke - arkose	good	1		
Volcanic (slightly weathered)	good	1	4,5	6
Granite - diorite	good	1		
Trap	good	1	6	10
Magnetite	good	1		
Pyrite (disseminated in trap)	good	1		
Iron bearing quartzite	good	1		
Sedimentary conglomerate (hard)	good	1		
Carbonates (slightly weathered)	fair	3		
Carbonates (sandy, medium hard)	fair	3		
Sandstone (medium hard)	fair	3	1,2	3
Crystalline carbonates (hard)	fair	3		
Crystalline carbonates (slightly weathered)	fair	3		
Gneiss (soft)	fair	3	3,4	6
Chert and cherty carbonates	fair	3		
Granite (friable)	fair	3		
Volcanic (soft)	fair	3	5,6	10
Pyrite (pure)	fair	3		
Flints and jaspers	fair	3		
Carbonates (soft, slightly shaly)	poor	6		
Carbonates (soft, sandy)	poor	6		
Carbonates (deeply weathered)	poor	6		
Carbonates (shaly clay)	poor	6	1,2	6
Carbonates (ochreous)	poor	6		
Chert and cherty carbonates (weathered)	poor	6		
Sandstone (soft, friable)	poor	6	3,4,5,6	10
Quartzite (fine grained)	poor	6		
Crystalline carbonates (very soft, porous)	poor	6		
Gneiss (friable)	poor	6		
Granite (friable)	poor	6		
Encrustations	poor	6		
Concretions	poor	6		
Schist (soft)	poor	6		
Ochre	Deleterious	10		
Shale	Deleterious	10		
Clay	Deleterious	10		
Decomposed volcanics	Deleterious	10	1,2,3,4,5,5	10
Slates	Deleterious	10		
Talc-gypsum	Deleterious	10		
Iron formations (very soft)	Deleterious	10		
Sibley formation	Deleterious	10		
Ultramafics	Deleterious	10		

Referenced in part from: Canadian Standards Association CSA Standards A23.1-A23.2-A23.4, Rexdale, Ontario, 1973.

MINERAL DEVELOPMENT DIVISION
ENVIRONMENTAL GEOLOGY SECTION

QUATERNARY GEOLOGY
STRATIGRAPHIC LOG

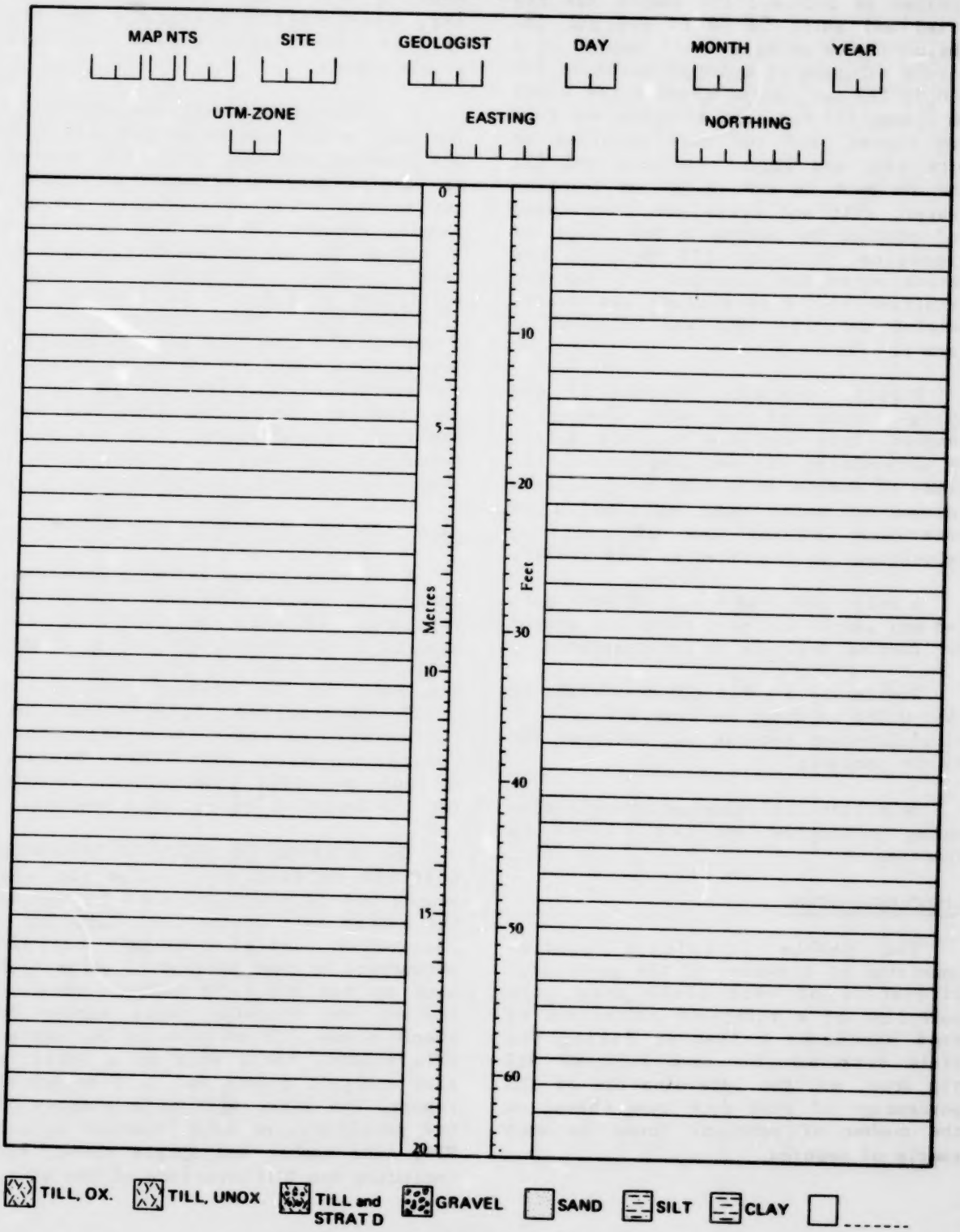


FIGURE 7: STRATIGRAPHIC LOG FORM

Glacial tills and samples with a high silt and/or clay content were treated as follows: the sample was (1) dried and split to 70 to 140 gm; (2) deflocculated using a small amount of a dilute solution of hydrogen peroxide (3% H_2O_2); (3) wet sieved through the 0.062 mm sieve; (4) the sand fraction was then dry sieved, and the data recorded as with sand and gravel samples; and (5) the sediment in the -0.062 mm fraction (water, silt and clay) was flocculated and settled by adding a few drops of magnesium chloride (1M $MgCl_2$), the excess water was siphoned off and the resultant silt-clay mixture was dried, weighed and this data was recorded on Form II (Figure 5).

Pipette analyses (Figure 8) are being conducted on all clay-rich samples. This analysis consists mainly of determining the settling rate of 25 grams of sample in a 1000 ml graduated column of water over selected time intervals (Stokes Law of settling velocities) as described in Folk (1974).

A split (40 dram vial) of each bulk (-8 mm) sample was also taken and stored for further analysis and/or reference.

Similarily a split (10 dram vial) of the -0.062 mm fraction from all till or silt/clay-rich samples was retained for future analysis.

Selective till geochemistry is also being conducted on the -0.062 mm fraction.

LITHOLOGIC STUDY

The pebble lithologic studies consisted of a review of the geological literature of each study area, the selection of a reference collection of rock specimens collected during the field traverses for each 1:50,000 NTS map area, and the determination of the percentage of each rock type (based on the number of pebbles) found in each sample of pebbles.

The studies included information on the silt/clay coating, weathering, staining, sphericity, rounding, fracturing, mineralogy and texture for the various lithologies present in each pebble sample.

A petrographic number was calculated for each pebble sample as modified from CSA Standard A23.2.30 (NOTE: the percent of pebbles present is based on number, not weight). The petrographic number, ranging between 100 and 1000 is derived by taking the sum of the percentages of each pebble lithology present, multiplied by a factor assigned to that lithology type. Petrographic No = (% Lithology X Factor for that Lithology). The factors table in Figure 6B reflects the quality of the lithology for use in construction. One lithologist has been employed for the majority of the study thereby making the petrographic numbers generally relative, one to another.

DATA HANDLING, PROCESSING AND RETRIEVAL

A computer system is being developed that will allow for the search and retrieval of data on file and the reporting of these data in a format readily understood by potential users. The base for the system will be the "SIR" (Scientific Information and Retrieval) package, a system that interfaces with TSO (Time Sharing Option) and SPSS (Statistical Package for the Social Sciences) data systems.

The INVENTORY OF AGGREGATE RESOURCES COMPUTER PACKAGE will allow for the search and retrieval of data by way of the master file report (all data for a particular site) using certain parameters or combinations of parameters such as map NTS, UTM zone, ranges of easting and northing, site number or sample number. In addition to the master file report, there will be a particle size analysis report and a lithological report. The first will be a summary of the particle size data reported by map NTS, site number and sample number and including the UTM locations of the site,

FIGURE 8: PIPETTE ANALYSIS FORM

Sample No.	Site No.	Map No.	Analysis	Date	Lab. Temp. °C.	Sample Wt. (g)	Dispersed Color
␣␣ ␣␣␣	␣␣	␣␣ ␣ ␣␣	␣␣	␣␣␣␣	␣␣	␣␣.␣␣	␣␣␣ ␣/␣

diam.	Withdrawal Depth (cm)	Withdrawal Time	Pan. No.	Pan Wt. (g)	Pan & Sample Wt.	Weight	Wt. X 50	Cumulative %
+2Ø								
+4Ø								
4Ø	20	20 s						
5Ø	10	1 min 56 s						
6Ø	10	7 min 44 s						
7Ø	10	31 min						
8Ø	10	2 h 03 min						
9Ø	5	4 h 06 min						
10Ø	5	16 h 24 min						

Remarks _____

_____

_____

the percents sand, gravel and silt/clay, the percent water, the petrographic number and some basic data on the nature of the deposit sampled. The lithology report will summarize by map NTS, site number and sample number, the basic lithological percents present in each sample, the petrographic number and other data such as the silt/clay coating, weathering, staining and mineralogy of the analysed pebble sample.

Particle size analyses will also be presented as cumulative graphs (Figure 9).

The SIR system will allow the user to write additional programs to search the complete data base to meet specific needs or inquiries not predicted at this time. The staff of the Environmental Geology Section are being trained as the main users of the system.

RESULTS

SURFICIAL MAPPING

An integral part of the Inventory of Aggregate Resources has been 1:50,000 scale reconnaissance level surficial geology or landform classification mapping for the corridor study area. This mapping, compiled from interpretation of 1:50,000 scale black and white airphotos, has been field checked within the 6 km road corridor, but not necessarily in areas more than 3 km from roads, or for all nongranular resource landforms in off-road areas.

In some instances airphoto interpretation has been extended outside the study corridor area. This occurred when previous surficial interpretation covering a whole map area was utilized or when only a small portion of a map outside the corridor study area was needed to complete coverage of the map area.

Mapping is nearing completion on a total of 160 maps within the study area (Figures 10 and 11). Maps are presently available as blueline copies from a contoured cronoflex topographic base map. Existing mapping has been utilized wherever possible, and has been modified to conform to the system used by the Environmental Geology Section, Newfoundland Department of Mines and Energy. Various surficial mapping and other available works are noted in the selected bibliography list.

Mapping for east-central Labrador by Fulton *et al.* (1974) has not been remapped or redrafted. There are about 200 1:50,000 scale photo-mosaic maps in this publication (see Figure 11). Copies from microfiche only are available for viewing from the Publications and Information Section. Blueline copies of two 1:500,000 scale clear base map sets - (a) glacial flow features, and (b) landform units, of Fulton's mapping are also available; as are 1:250,000 scale reproduction of this same mapping for 3E, 13A, B, C, D, E, G, H, I, J, K, L and O, and 23H.

Surficial mapping by the Department of Mines and Energy outlines landforms and/or landform complexes, and special features (Figure 13) such as glacial flow features, etc. A detailed description of the landform types and the landform classification system follows. Table I outlines the codes used. A specimen map (Figure 12) illustrates the mapping format.

Surficial Classification

The geomorphological classification is based on a landform system similar to that used by Fulton *et al.* (1974); Grant (1973); and Vanderveer (1975). Each landform system consists of a combination of one or more landforms. Each landform is designated by a genetic category and a morphological modifier. The genetic category denotes the type of deposit and the morphological modifier describes the possible mode of formation of each deposit.

FIGURE 9: CUMULATIVE GRAPH

MINERAL DEVELOPMENT DIVISION, ENVIRONMENTAL GEOLOGY SECTION, PARTICLE SIZE ANALYSIS

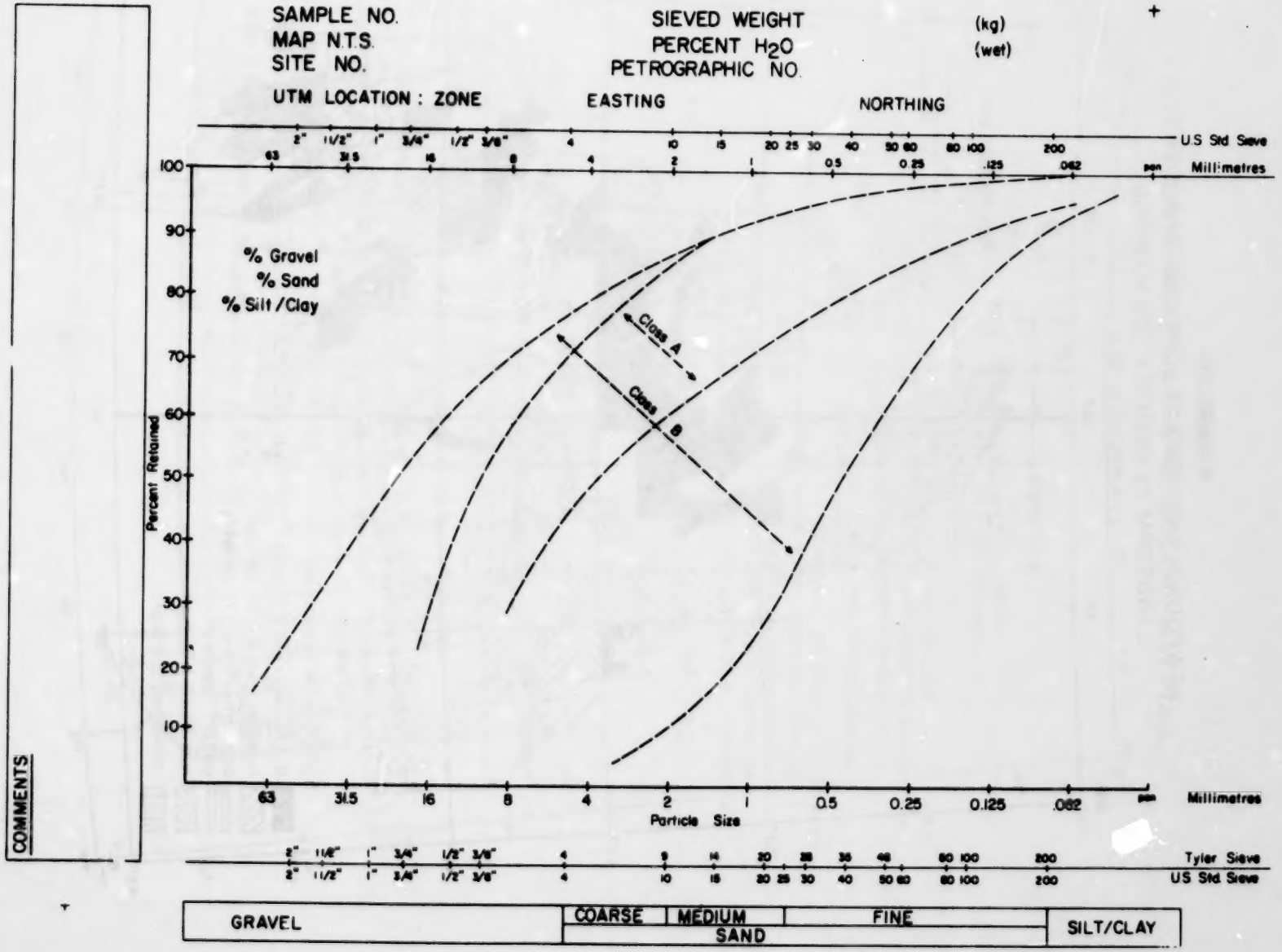


FIGURE 10
NEWFOUNDLAND INDEX OF SURFICIAL GEOLOGY
LANDFORM CLASSIFICATION MAPPING
(1:50,000 SCALE)

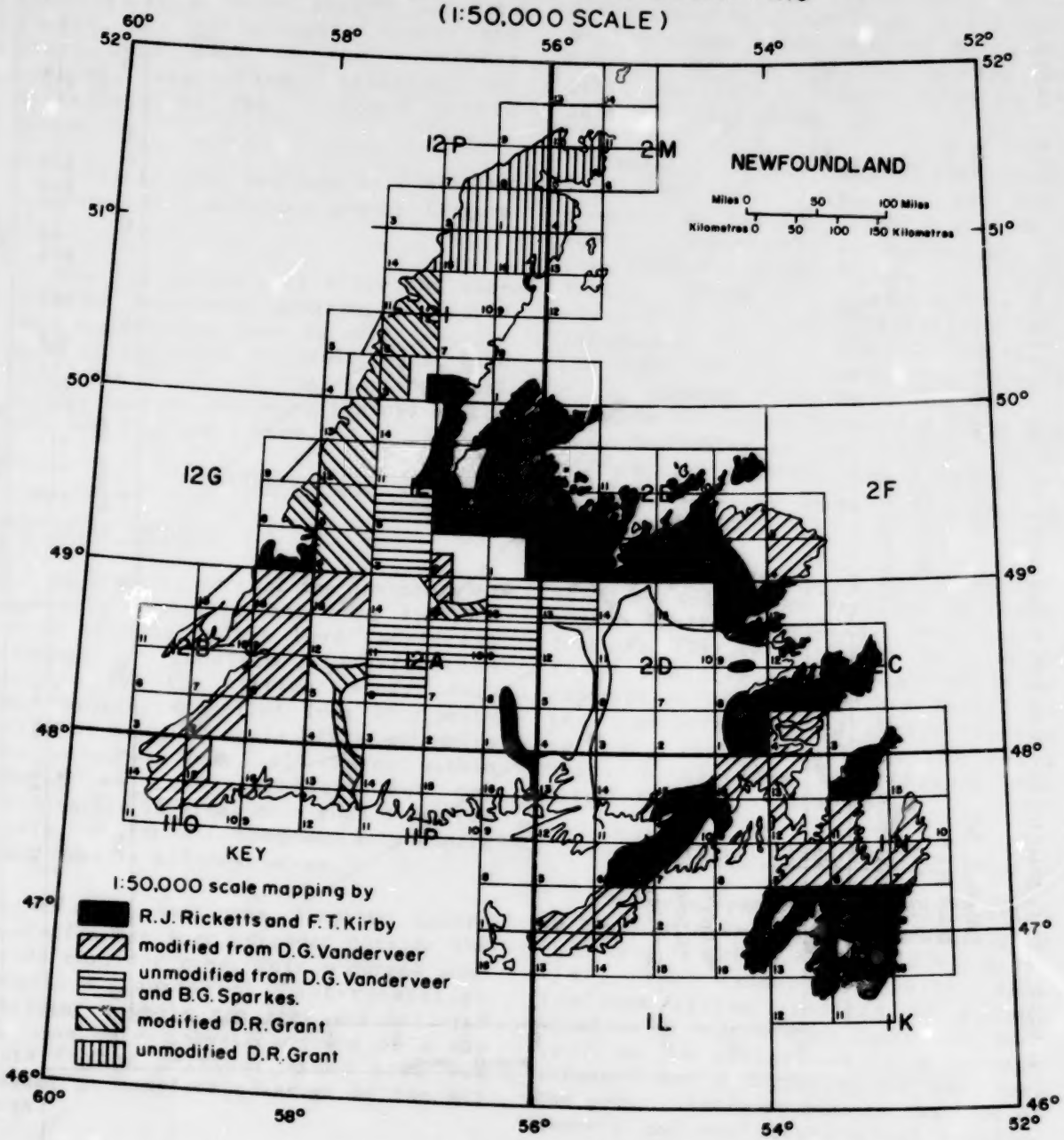


FIGURE 11
LABRADOR INDEX OF SURFICIAL GEOLOGY MAPPING

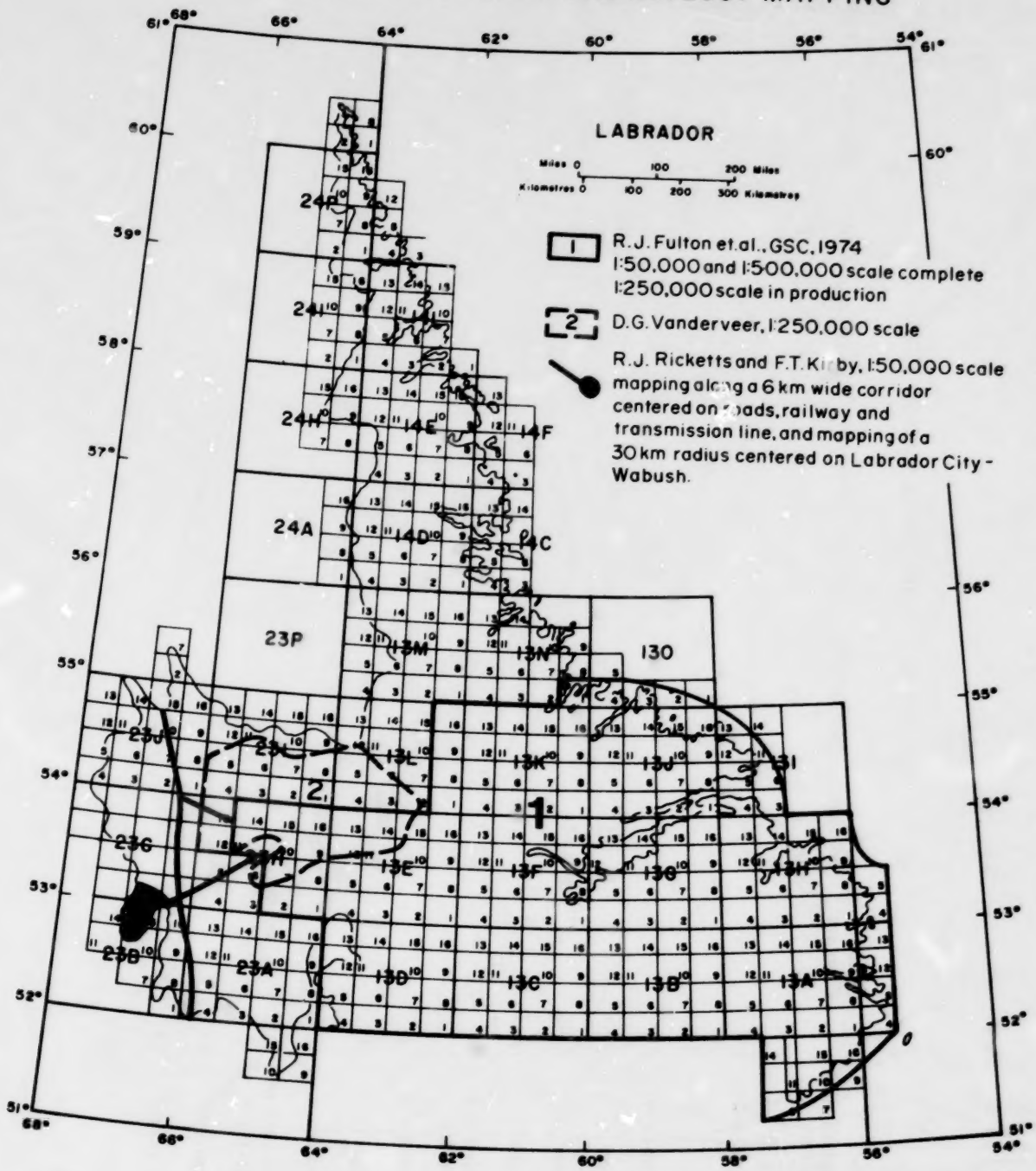


Table 1

SURFICIAL LANDFORM CLASSIFICATION

Morphological Modifier:		Genetic Category:	Morainal	Glaciofluvial	Alluvial	Marine	Lacustrine	Eolian	Colluvial	Organic	Rock
			T	G	A	M	L	E	C	O	R
drumlinoid	(d)		Td								
plain	(p)		Tp	Gp	Ap	Mp	Lp			Op	
hummocky	(h)		Th	Gh				Eh			
ridged	(r)		Tr	Gr		Mr	Lr	Er		Or	Rr
veneer	(v)		Tv	Gv	Av	Mv	Lv	Ev	Cv	Ov	
terraced	(t)			Gt	At	Mt	Lt				Rt
eroded and dissected	(e)		Te	Ge		Me	Le		Ce		
kettled	(k)		Tk	Gk							Rk
deltaic	(f)			Gf	Af				Cf		
lineated	(l)		Tl					El		Ol	Rl
concealed by vegetation	(c)								Cc		Rc
weathered	(w)							Ew			Rw
complex	(x)		Tx	Gx		Mx	Lx				Rx
apron	(a)								Ca		

FIGURE 12

SPECIMEN PORTION, 1:50,000 SCALE SURFICIAL GEOLOGY LANDFORM CLASSIFICATION MAP 12H/3

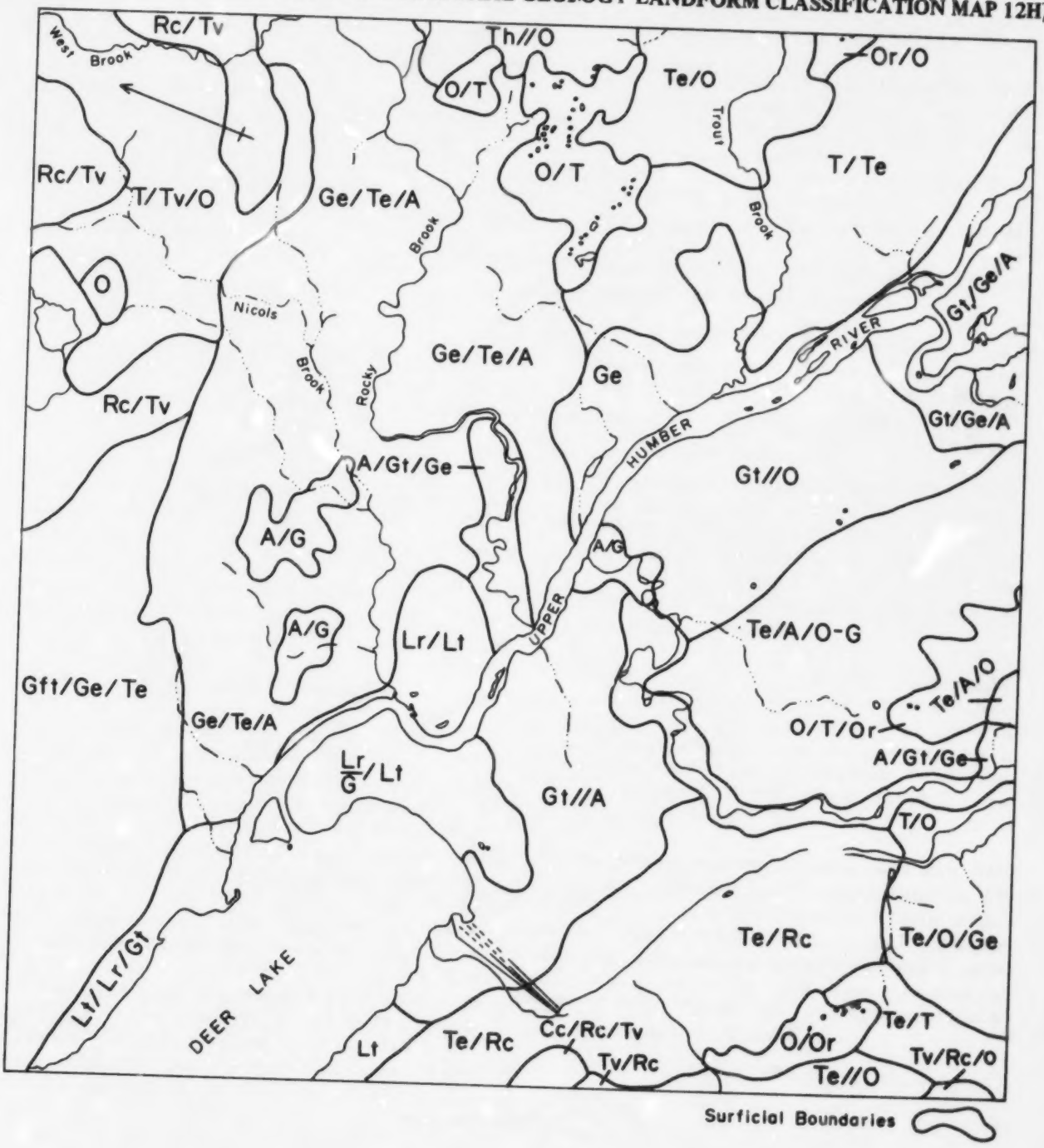


FIGURE 13: ON-SITE SYMBOLS FOR SURFICIAL MAPPING

Till fabrics (fabric direction known, unknown, and with cross-fabric

End moraine

Minor moraines, rib moraines, washboard moraines, "annual" moraines, till ridges transverse to ice flow (irregular, straight)

Drumlins, drumlinoid ridges (direction of ice movement known, unknown)

Crag and tail hills and ramps

Roche moutonnee

Glacial linear feature

Pingo or palsen

Esker (direction of flow known, unknown)

Esker (continuous, discontinuous)

Raised beaches

Limit of marine or lacustrine submergence (well marked, assumed)

Dunes

Area of sand dunes

Meltwater channel

Glacial striae (direction of ice movement known, unknown)
Numbers indicate relative age, 1 being the oldest

Landslide scar (area of slope failure)

Escarpment and cirques

Sinkhole — SH

Fossil locality — F

Locality where age has been determined, in thousands of years B.P. (before present) — F 14.7

Ice divide

Land system boundary

Location of measured section

Gravel pit or quarry (active, abandoned)

Borrow pit (active, abandoned)

Rock dump or tailings

Rock Quarry (active, abandoned)

Open pits or quarries

Marl — m

SAMPLE LOCALITIES

Glacial till	●	Clay	+
Gravel	●	Organic	●
Sand	○	Rock	R
Silt	■	Pleistocene fossil	F

Genetic Category: The genetic categories indicate the basic deposit types, for example, morainal material (T) is generally unsorted and structureless such as till. Similarly, an area referred to as glaciofluvial (G) would include material lacking in fines, moderately sorted and possibly stratified. Nine genetic categories (see Table II) are recognized: Morainal (T), Glaciofluvial (G), Alluvial (A), Marine (M), Lacustrine (L), Eolian (E), Colluvial (C), Organic (O), and Rock (R). Fluvial materials have been included under the glaciofluvial category. The complete definitions for the genetic category may be found in Table II.

Morphological Modifiers: Each genetic category is subdivided using morphological modifiers which describe the mode of formation of a deposit. For example, Td refers to drumlinoid morainal deposits, Te to eroded or dissected morainal material, Mr to a ridged marine beach deposit and Tve to an eroded veneer of till. Fourteen morphological modifiers (see Table III) are used. A genetic category symbol used without a morphological modifier represents an undifferentiated form of that category.

Landform System: Each area outlined on a surficial map has been assigned a landform system consisting of up to three genetic categories plus modifiers that designate the types of deposits within each area. Each category within a landform system is listed in the order of prominence of its occurrence in the defined area and is separated from the other categories by a slash, *e.g.* Tv/R. The areas have been divided so that normally a maximum of three landforms are identified within a given area. Six variations of landform systems are possible. The landform classification system is also used to denote the approximate percentage of landforms occurring within an outlined area.

1) A single slash (/) is used to separate the different landforms. The slash can normally be used to separate up to three landforms. *e.g.* Tv (60-85%)/R(15-40%) or Tv (45-80%)/Th (15-40%)/R (5-15%).

2) A double slash (//) is normally used to separate two different landforms *e.g.* Tv (85-95%)//R (5-15%).

3) Stratigraphy or superposition of a preceding genetic landform over the following landform is represented as follows, *e.g.* $\frac{OV}{T}$. This indicates that 95-100% of the area is an organic veneer over till.

4) Transition zones between two landform types where both have approximately the same percentage are denoted by a dash, *e.g.* Te (35-40%) - Tl (35-40%)/R (15-20%).

5) Stratigraphy wherein more than one landform type overlays another landform type *e.g.* $\frac{O/G}{T}$ indicates that approximately 60-80% of the area is covered by organics and 20-40% is covered by glaciofluvials and all is underlain by till.

6) Stratigraphy indicating that only one unit overlays some of the other units *e.g.* Tv/$\frac{O}{T}$ indicates that 60-85% of the surface area is covered by a veneer of till (Tv) and that the remainder of the area (15-40%) is organics over till.

It should be noted that you may get different combinations and variations of the above landform combinations *e.g.* Te-Tl/$\frac{O}{R}$ indicating that 15-20% of the area is covered by organics which are underlain by rock and the remainder (80-85%) is made up of approximately equal amounts of Te and Tl.

Table II

SURFICIAL LANDFORM CLASSIFICATION

GENETIC CATEGORY DEFINITIONS

SYMBOL	MATERIAL AND PROCESS	ORIGIN AND CHARACTERISTICS OF MATERIAL
A	Alluvial	Usually less than 1 m thick and confined to material deposited at or near modern-day flood plain levels. Similar to Glaciofluvial in particle size.
C	Colluvial	Product of mass wastage or rock falls; massive to moderately stratified, nonsorted to poorly sorted sediments with usually angular material ranging from clay to boulder size.
E	Eolian	Materials transported and deposited by wind action usually medium to fine sands and silt, well sorted, poorly compacted, and may be massive or show internal structure such as cross-bedding.
G	Glaciofluvial	Material deposited from glacial melt water and usually lacking in fines, moderately sorted and possibly stratified; normally >1 m thick, and located above present day flood levels. Post-glacial fluvial materials have been included in this category.
L	Lacustrine	Materials having settled from suspension in bodies of standing fresh water such as stratified and sorted sand, and silt-clay, and/or gravels created from shoreline wave action and deposited above present day lake levels.
M	Marine	Usually clay and silt, although gravels and sands may occur locally, moderately well stratified and sorted, and in some cases containing shells; includes deposits above present day marine limits. Glaciofluvial or fluvial derived sediments deposited in a marine environment are not classified as marine unless they are substantially modified by marine wave action.
T	Morainal	Unsorted and structureless material derived through glaciation such as till, usually containing material with size ranges from boulder to silt/clay sizes.
O	Organic	Usually poorly drained accumulations of decomposed peat mosses and other organics.
R	Rock	Defined where clearly visible or covered only by a thin soil mat or veneer of regolith <1 m thick, not derived from any of the above processes.

Table III

SURFICIAL LANDFORM CLASSIFICATION

MORPHOLOGICAL MODIFIER DEFINITIONS

EXPRESSION		DESCRIPTION
a	apron	A sheet of sand or gravel lying for some distance in front of the terminal moraine or extending out from the banks of a lake or river; also, a series of coalescing colluvial fans at the base of a rock escarpment.
c	concealed by vegetation	Indicates lack of appreciable overburden above bedrock or colluvial surfaces.
d	drumlinoid	Elongated ridges 3-50 m high, 15-1000 m long, 5-300 m wide, formed independent of bedrock control in till, and are generally tapered in the down ice direction, and parallel to the direction of glaciation.
e	eroded and dissected	Cut by a series of closely spaced gullies or deeply incised channels.
f	deltaic	Fan shaped deposits, having a surface either flat or dipping away from the apex.
h	hummocky	A collection of closely spaced steep-sided hills exhibiting no pronounced orientation, usually chaotic in plan.
k	kettled	Surface depressions, formed by melting of ice blocks in glacial sediments (also includes karst depressions in bedrock).
l	lineated	Features raised above the surrounding terrain exhibiting a pronounced parallel or subparallel orientation.
p	plain	Deposits greater than 3 m thick, usually areally extensive, that have few definable surface expressions and that mask all bedrock features. Includes extensive blackets of drift.
r	ridged	Narrow, steep-sided elongated hills (includes eskers).
t	terraced	Step-like topography, including both scarp face and usually level surface above it; *e.g.* marine terrace, kame terrace.
v	veneer	Deposits <3 m thick, with features of the underlying topographic rock unit usually evident.
w	weathered	A veneer, usually <1 m thick, of *in situ* decayed rock or sediment.
x	complex	Usually indicates numerous esker ridges in close proximity; but may also be used where any genetic category exhibits numerous surface expressions in a small surface area.

AGGREGATE RESOURCE MAPPING

Two hundred cronoflex topographic base maps at a scale of 1:50,000 are on file depicting zones of aggregate potential, numbered sample locations by type of deposit (*i.e.* sand, gravel, silt, clay, till, etc.) and showing the type and status of mapped pits and quarries. The format for these data is outlined in the legend and specimen map following (Figures 14 and 15 respectively). Quantity and quality designations - *i.e.* petrographic analyses and presence of deleterious substances will be incorporated into the final map format.

Field work has generally been confined to a 6 km wide corridor centered along all primary, secondary and tertiary roads in the province. A more comprehensive description of the parameters for the study has already been defined in this text.

Areas of aggregate potential were defined from preliminary interpretation of 1:50,000 scale black and white airphotos. These areas were subsequently field checked, sampled and zoned according to their aggregate potential as follows:

Zone 1: These areas, usually verified by field checking, contain a large quantity of usable granular material. The depth of these deposits is usually greater than three metres. This designation also includes esker ridges. There may be existing active or abandoned pits and quarries in this zone and the prospect of establishing future operations is considered moderate to high.

Zone 1b: These zones are underlain by predominantly sand size materials. Quantities are usually quite substantial and have high potential for commercial sand extraction. These zones have been verified through field checking.

Zone 2: These areas usually contain limited quantities of usable granular material. The depths are usually less than three metres and may be classified as a veneer. Large mined out areas with small reserves of material remaining are also included in this zone designation. These areas have been verified through field checking and the potential for establishing future pits and quarries is moderate to low.

Zone 3: These areas have usually been defined only from airphoto interpretation although some may have been verified by field work. These are usually in inaccessible areas (*i.e.* outside the 6 km corridor) or in areas which are covered by thick bog or some other material which makes identification and sampling of any deposit beneath impossible, using the techniques employed in this study. These deposits are unsubstantiated and the probability of locating usable granular deposits is considered to be low.

Zone 4: These zones have usually been identified where there is a lack of any good quality granular material (*i.e.* Zones 1 or 2) in the general area. These are usually made up of sandy tills, colluvial or weathered bedrock materials generally with a silt/clay content of less than 15%, as determined by the laboratory analyses.

All areas with no zone designations are considered to have no known potential but this does not completely rule out the possibility that these areas could contain aggregate deposits.

It should be noted that the boundaries around designated areas (zones) are arbitrary as determined from

airphoto or field interpretations and may not represent the true extent of any deposit that may be used as a source of aggregates.

These maps have been published (Environmental Geology Section, 1982) and are presently available on microfiche or as blueline copies from the Environmental Geology Section or from the Publications and Information Section. All data are filed by map NTS (National Topographic System) number. The reference maps (Figure 1 and 2) illustrate the areas covered by the survey and the map indexing system. For example, 12H/03 would be a 1:50,000 scale map (03) within the 1:250,000 scale map block 12H. Site and sample data, Forms I and II (Figures 3 and 5) are filed and may be referenced in the same manner as the maps.

SUMMARY MAP INDEX, 1:250,000

Set A: Sample Sites

These 29 maps illustrate the locations of samples by sample type, and are available as blueline copies from 1:250,000 scale cronoflex base maps which also contain drainage, roads, and place names (no contours).

This map series is filed and referenced by NTS number, (*e.g.* 2E or 12H) as outlined on the index maps (Figures 1 and 2).

A specimen portion of a map depicting sample sites is included (Figure 16).

Note: For mapping purposes on the 1:250,000 scale, multiple samples at individual localities are usually summarized by the predominant or most significant aggregate type sampled at that particular site.

Set B: Geology Emphasizing Geotechnics

The number of maps, the map base, and the index reference is the same as for Set A. This map series is basically a compilation of existing geological mapping, with the emphasis placed on the rock lithologies and the geotechnical aspects of the rock units mapped and sampled in the field.

Compilations were made from the most up-to-date 1:50,000 scale mapping available wherever possible. Small scale mapping has been utilized in the absence of more detailed mapping.

Map units are defined by rock type(s) wherever possible, rather than by age (group or formation). The geotechnical aspects of these rock type units were noted where possible, *i.e.* petrographic factor, quarriability, uses for construction and lithology.

These notations are complemented or verified by rock samples taken in the field, a reference collection of which is kept in the Department of Mines and Energy core storage building at Torbay. The sample locations are also plotted and referenced by sample numbers on the 1:50,000 scale aggregate resource map.

A specimen map (Figure 17) illustrating the type of map compilation used and a sample legend (Figure 18) are included. Marginal notes accompany these maps to outline the above noted geotechnical aspects of the geology.

SET C: Aggregate Zones

The number of maps, the map base, and the NTS index reference system is the same as for Set A above. The Set C map series depicts zones of aggregate potential as summarized from the 1:50,000, scale aggregate resource mapping.

A specimen map depicting the mapping format and a specimen legend are included (Figures 19 and 20, respectively).

Colored Aggregate Resource Map Series

The corresponding maps of Sets A and C above have been combined into a multi-colored series of 29 1:250,000 scale maps to accompany this report.

FIGURE 14

1:50,000 Aggregate Resources

SPECIMEN LEGEND

1	*Areas known to contain usable granular materials. Probability of locating economic deposits is moderate to high. May include active or inactive pits and quarries*
~~	*Eskers - Sinuous ridges of granular materials, moderate to high potential for locating economic deposits*
1b	*Areas known to contain granular materials of predominantly sand size. High potential for economic sand exploitation, low to moderate potential for other coarser granular type materials*
2	*Areas containing thin or discontinuous or nearly depleted usable granular materials. May also include areas where extent of thicker deposits could not be determined by field investigation. Probability of locating usable deposits is moderate to low*
3	*Areas that may contain usable granular materials but deposits not substantiated by field investigation. Probability of locating usable deposits is low to moderate*
4	*Areas of possible usable materials of nongranular composition, e.g., sandy tills, colluvial or weathered bedrock materials generally containing less than 10 to 15% silt/clay that may be beneficiated for higher grade uses*
	Areas having no known potential for location and production of granular materials

NOTE: *Classification criteria do not include conflicting land uses for routine purposes*

⚒ ⚒	*Sand or gravel pit (active, abandoned)*
⚒ ⚒	*Borrow pit of low quality material (active, abandoned)*
⚒ ⚒	*Rock quarry (active, abandoned)*
●●○■ ✚✱Ⓡ	*Sample locations (till, gravel, sand, silt, clay, organic, or rock respectively)*
●78-3000 ⚒	*Location of gravel sample No. 3000 taken in 1978 from an active gravel pit. Sample location ⊗ also denotes location of pit*
✖ ●78-3001 ○78-3002 ■78-3003	*Location of multiple samples from same site ✖ . Shown in stratigraphic order*

Scale 1:50,000

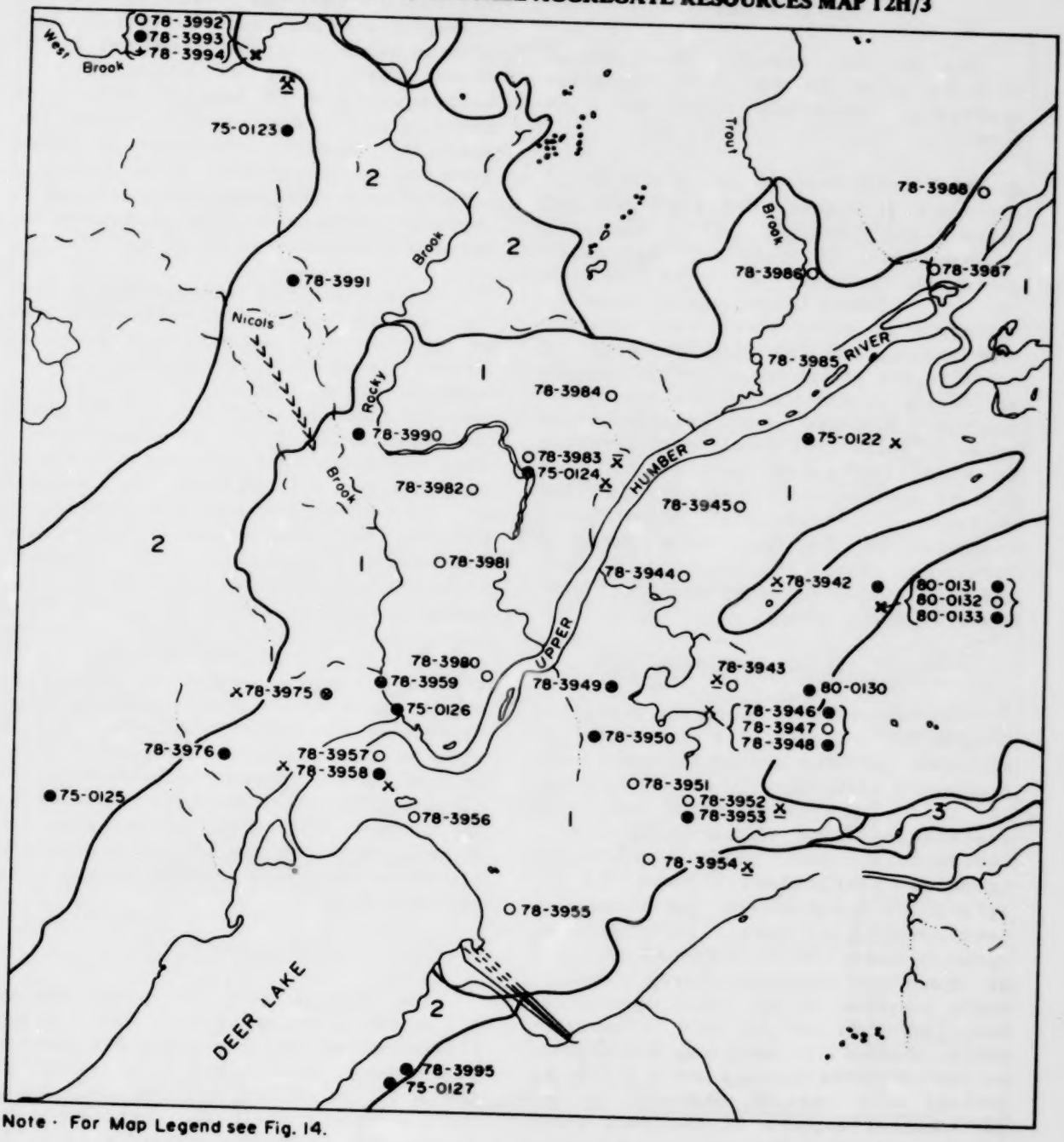
Miles 0 — 1 — 2 Miles

0 — 1000 — 2000

Metres

FIGURE 15

SPECIMEN PORTION, 1:50,000 SCALE AGGREGATE RESOURCES MAP 12H/3



Note · For Map Legend see Fig. 14.

These maps may be referenced as Open File Nfld. 1287 and Open File Lab. 602.

FUTURE PLANS

Quality and quantity designations will be added to the 1:50,000 scale aggregate resources maps as time permits.

As a complement to the Inventory of Aggregate Resources, the Department of Mines and Energy has recently implemented the Detailed Aggregate Assessment Program, which is designed to: (a) locate alternate sources of aggregate in areas where such reserves are lacking, and (b) designate areas of deposits for preservation for extraction activities to sustain current and future aggregate demands, particularly where urban or industrial development threaten to sterilize known sources of good quality aggregates. Preliminary detailed aggregate assessments have been conducted in the Gros Morne National Park area, in the St. John's urban area and in a number of other municipal plan areas of Newfoundland.

CONCLUSIONS AND RECOMMENDATIONS

The Inventory of Aggregate Resources program has accumulated a vast amount of aggregate resource and landform data not previously available. To date, heavy use of this data has been made by geotechnical and engineering firms, contractors, and other government agencies particularly crown lands, agriculture and municipal and industrial development planners. In addition, agencies involved in megaprojects such as Hydro or offshore-related developments continue to use this material as base line data for resource or environmental studies. In addition, information on the surficial geology and the bedrock geology with special emphasis on the geotechnical aspects of the rock types is now available. The data generated by the program has been used in other mapping activities such as a shoreline classification study conducted by the Federal Lands Directorate and used as a reference in the assessments of transmission line route selection. This program has also proved essential in the department's role of managing this nonrenewable resource and, in particular, identifying areas of aggregate resource shortages or where land use conflicts will arise unless a comprehensive land management program is implemented that includes allowance for aggregate resource extraction.

Major industrial development related to offshore oil, expansion of the provincial road network and proposed natural resource developments (*i.e.* hydro-electric, mining, forestry, etc.) require that the Inventory of Aggregate Resources study should be expanded on a moderate basis to infill those areas of Newfoundland and Labrador not included in this current project. For example, in Labrador the program would involve the aggregate assessment of coastal communities particularly those with proposed construction or development opportunities. (*i.e.* water and sewer projects or oil-related developments).* Similarly other areas of potential development (*i.e.* road construction, hydro-electric development, etc.) should also be covered by an expanded survey. On the island of Newfoundland any area of potential development not covered by the current project should be given top priority with the aim of having complete province-wide (first level) coverage by the year 1990.

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FIGURE 16

SPECIMEN PORTION, 1:250,000 SCALE SAMPLE SITES MAP 12H

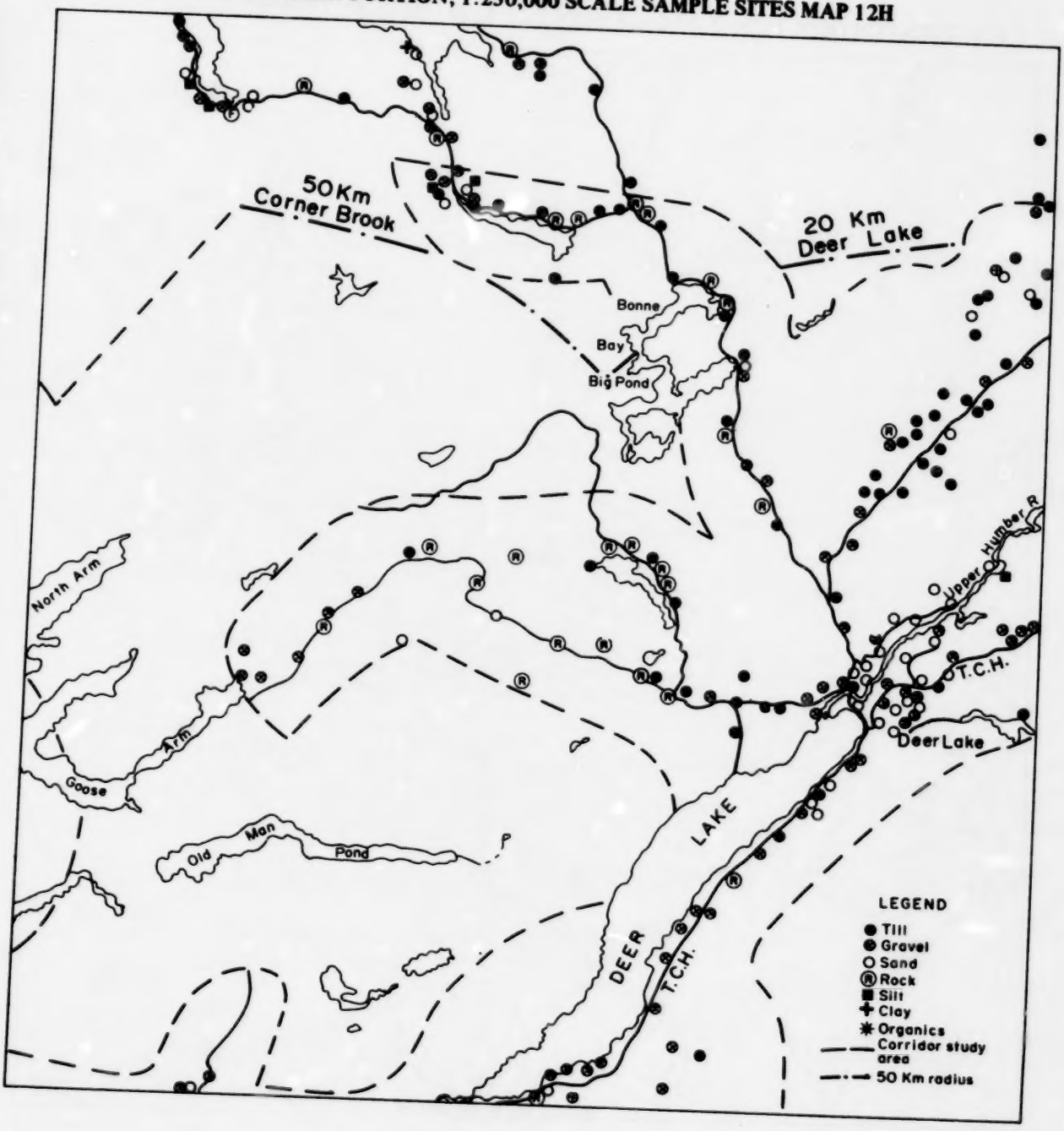
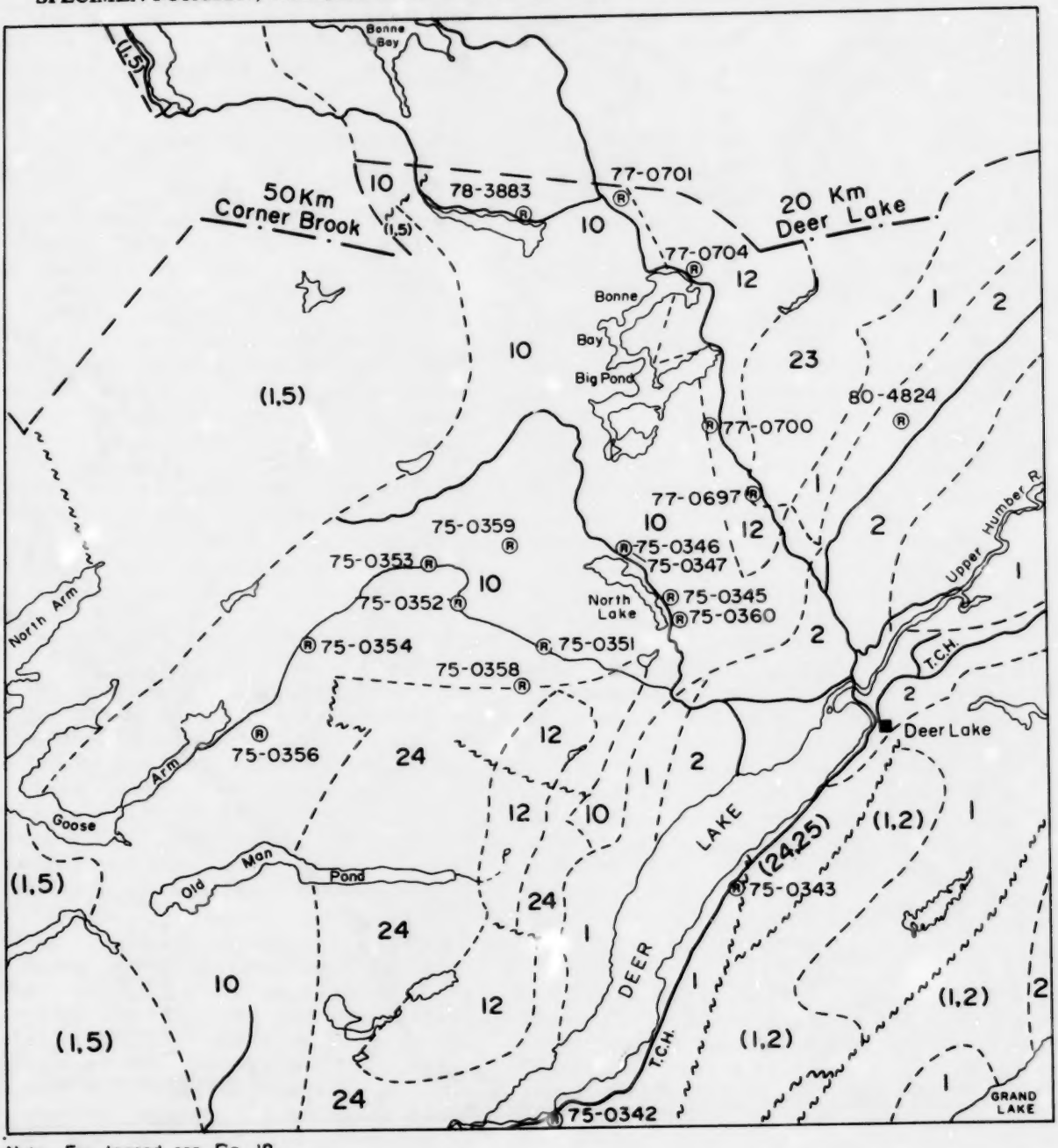


FIGURE 17

SPECIMEN PORTION, 1:250,000 SCALE GEOLOGY MAP 12H EMPHASIZING LITHOLOGIES



Note. For legend see Fig. 18

Lithology	Petrographic Factor Range	Usual Factor
1. Sandstone	(1-6)	(3)
2. Shale	(10)	(10)
3. Mudstone	(3-6)	(6)
4. Siltstone	(1-6)	(3)
5. Conglomerate	(1-10)	(6)
6. Arkose	(1-6)	(1)
7. Argillite	(3-6)	(6)
8. Graywacke	(1-6)	(1)
9. Chert	(1-3)	(1)
10. Limestone	(1-6)	(1)
11. Dolomite	(1-6)	(1)
12. Quartzite	(1-6)	(1)
13. Granite	(1-6)	(1)
14. Gabbro	(1-6)	(1)
15. Diorite	(1-6)	(1)
16. Granite-Diorite Series	(1-6)	(1)
17. Felsic Volcanics	(1-6)	(1)
18. Mafic Volcanics	(1-6)	(1)
19. Intermediate Volcanics	(1-6)	(1)
20. Felsic-Mafic Volcanics	(1-6)	(1)
21. Pyroclastics	(3-6)	(3)
22. Metavolcanics	(3-6)	(3)
23. Gneiss	(1-6)	(3)
24. Schist	(3-10)	(6)
25. Phyllite	(6-10)	(6)
26. Marble	(1-6)	(1)
27. Slate	(10)	(10)
28. Amphibolite	(6-10)	(6)
29. Ultramafic	(6-10)	(6)
30. Metasediments	(1-6)	(3)
31. Iron Formation	(6-10)	(10)
32. Drift Deposits	Any or all of the above	Any or all of the above

Note: (A) Where complex areas exist (undivided lithologies) two or more of the above numbers may be used in an area in order of dominance (*e.g.* 1,7). (B) Dikes, sills and minor lithologies are omitted from this map.

Petrographic Legend:	Factor	Classification
	1	Good
	3	Fair
	6	Poor
	10	Deleterious

SYMBOLS

Road. . . . .

Railway. . . . .

Power Line. . . . .

Edge of Corridor (Study Area Boundary). . . . .

Sample Location . . . . . ®75-0358

Geological Boundary (Assumed, Approximate, Gradational) . . . . .

Fault (Approximate) . . . . .

FIGURE 18: 1:250,000 SCALE GEOLOGICAL MAPPING LEGEND – SUMMARY

FIGURE 19

1:250,000 Zones of Aggregate Potential

SPECIMEN LEGEND

1	*Areas known to contain usable granular materials. Probability of locating economic deposits is moderate to high. May include active or inactive pits and quarries*
	Eskers - Sinuous ridges of granular materials, moderate to high potential for locating economic deposits
1b	*Areas known to contain granular materials of predominantly sand size. High potential for economic sand exploitation, low to moderate potential for other coarser granular type materials*
2	*Areas containing thin or discontinuous or nearly depleted usable granular materials. May also include areas where extent of thicker deposits could not be determined by field investigation. Probability of locating usable deposits is moderate to low*
3	*Areas that may contain usable granular materials but deposits not substantiated by field investigation. Probability of locating usable deposits is low to moderate*
4	*Areas of possible usable materials of nongranular composition, e.g., sandy tills, colluvial or weathered bedrock materials generally containing less than 10 to 15% silt/clay that may be beneficiated for higher grade uses*
	Areas having no known potential for location and production of granular materials

NOTE: *Classification criteria do not include conflicting land uses for routine purposes*

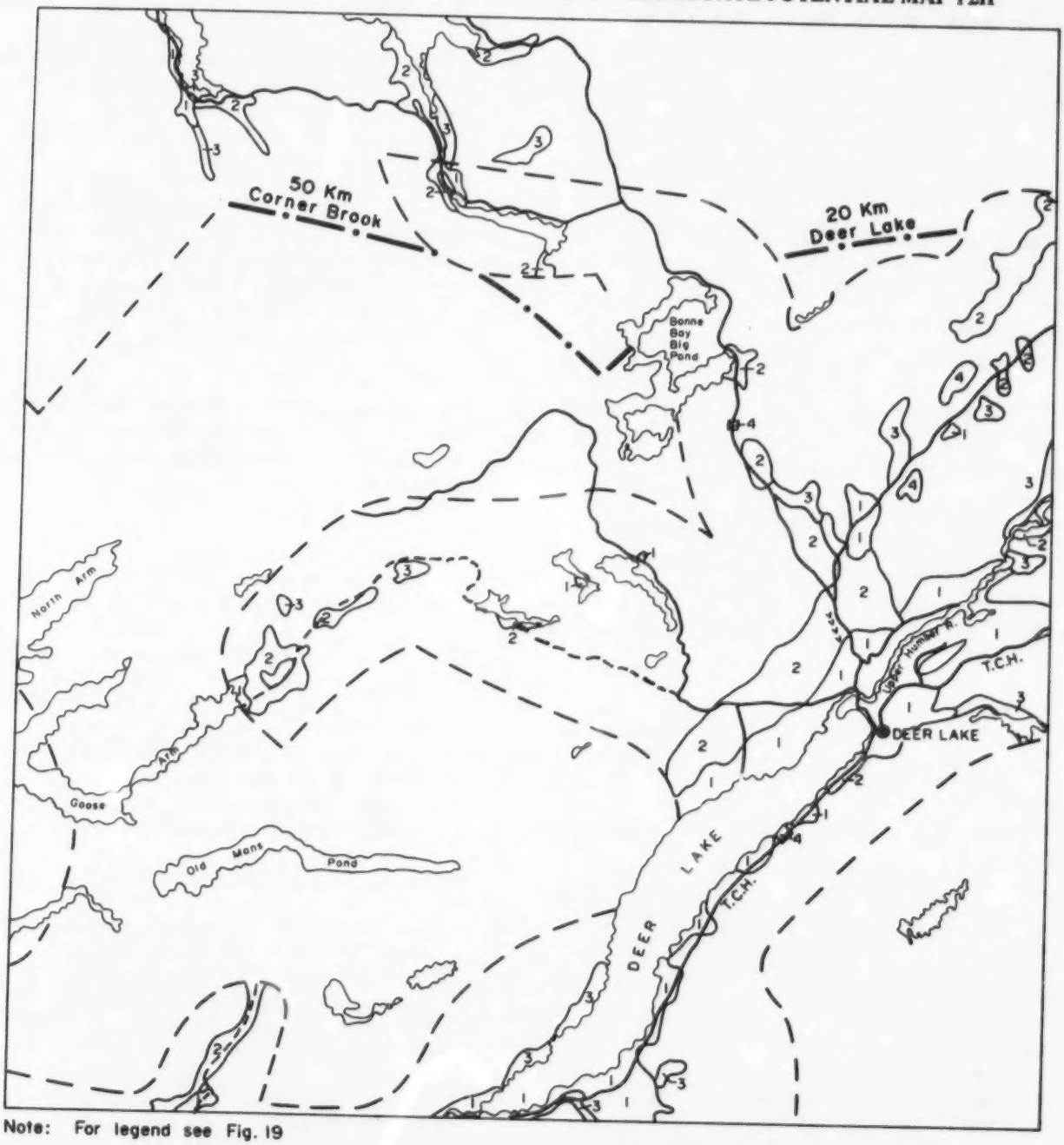
Granular resources disposition boundary

Study area boundary (6 km corridor, larger radius corridor around towns, cities)

Roads (primary, secondary or tertiary)

FIGURE 20

SPECIMEN PORTION, 1:250,000 SCALE ZONES OF AGGREGATE POTENTIAL MAP 12H



Note: For legend see Fig. 19

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POOR

QUALITY

ORIGINAL